

Socially facilitated extinction of a conditioned avoidance response*

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In the present experiment, rats were trained to avoid shock by crossing to the adjacent compartment in a one-way avoidance box. Extinction of this response was then carried out in the presence of: (1) three active rats, the social facilitators (SF) which had been trained not to avoid the conditional stimuli; (2) three completely anesthetized rats, the anesthetized social facilitators (ASF); (3) three objects (O); and (4) alone (C). Groups SF and ASF extinguished significantly faster than Groups O and C; however, there were no significant differences observed between Groups O and C or between Groups SF and ASF. It was concluded that anesthetized rats were as effective as the active, nonanesthetized rats in facilitating extinction of the avoidance response.

Previous experiments have studied the effect of the presence or behavior of other organisms (social facilitation) on the extinction of fear-motivated behavior. In one of the earlier experiments on the subject, Masserman (1943) observed that the normal feeding behavior of a cat gradually reduced the conditioned fearful feeding behavior of another cat. Davitz and Mason (1955), using an activity measure as a behavioral index of fear, reported that the presence of a nonfearful rat in an open-field situation reduced the strength of the fear response in another rat. Hake and Laws (1967) concluded that the presence of a pigeon emitting a keypecking response during the presentation of a warning stimulus restored the keypecking behavior that had been suppressed in another S by the warning stimulus. Latané and Glass (1968) tested whether rats in an open-field situation are attracted only to other rats or to any object. The results showed that rats are very much attracted to each other, only somewhat attracted to an anesthetized rat, and not at all attracted to a small toy car. The Ss showed less defecation and immobility with another rat than when tested alone, with an anesthetized rat, or with the object. It was suggested that interaction and mutual responsiveness may be critical factors for social attraction and fear reduction. In another experiment, Korman and Loeb (1961) observed that the presence of a rat did not facilitate extinction of fear-motivated behavior. However, in this study, the interaction between the experimental rat and the stimulus rat was curtailed by a wire mesh. Baum (1969) trained rats to avoid intense electric shock by jumping onto a safety ledge. Once the Ss had learned the avoidance response, they were given a response

prevention extinction treatment which consisted of blocking the avoidance response by retracting the safety ledge. When the response prevention was done in the presence of two nonconditioned rats, the result was an increase in the efficacy of the response prevention technique in facilitating extinction. An important variable in the socially facilitated reduction of a fear response seems to be the Ss' social history; animals reared in isolation seem to be insensitive to this social phenomenon (Angermeier, Philhour, & Higgins, 1965; Morrison & Hill, 1967).

There is, then, a clear indication from the literature that the presence or behavior of other organisms facilitate the reduction of fear-motivated behaviors. It is not clear, however, if the above phenomenon is specifically related to active behavior mutually oriented towards another organism or if the inactive presence of another member of the species is enough to facilitate the extinction of fear. It is not clear either what effects the introduction of social and nonsocial stimuli have upon the extinction of conditioned avoidance behavior. Objects and anesthetized rats have been introduced in open-field tests, but not in conditioned avoidance situations. The present study compares the resistance to extinction of a conditioned avoidance response when rats were tested in the presence of live rats, anesthetized rats, objects, and alone, during the extinction phase.

METHOD

Subjects

The experimental Ss were 36 Wistar male albino rats approximately 100 days old at the time of the initiation of the experiment. The Ss were housed in eight Wahman cages (LC-131); there were four Ss to a cage in four cages, and five to a cage in the other four cages.

Apparatus

The apparatus was a one-way avoidance box, divided into two compartments: A and B. The inside measurements of Compartment A were 33.66 x 27.94 x 29.21 cm; and of Compartment B, 24.77 x 27.94 x 29.21 cm. Two GE 313 bulbs

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and a Sonalert tone generator were localized immediately over the top of Compartment A. A 10.16 x 10.16 cm aperture in the middle of the plywood partition connected both compartments. The aperture could be blocked by a clear Plexiglas vertically-sliding door. The floor consisted of 0.317-cm stainless steel rods placed 1.91 cm apart that permitted electric current to be applied through it. The floor in Compartment B was hinged to the end side so that the weight of a rat was enough to activate a microswitch that could automatically terminate a shock and turn off the light and the tone. The shock generator was a constant current shocker (LVE 113-04).

Procedure

The Ss were randomly assigned to four groups of nine Ss each. Each S received a total of 54 acquisition trials. On the first day, the S was given 10 consecutive acquisition trials. Each training trial consisted of placing the S facing the wall opposite to the sliding door in Compartment A. Thirty seconds after the S was placed in Compartment A, the door opened and the tone and light stimuli were presented. Five seconds after the onset of the stimuli (door, tone, light), a 0.9-mA continuous shock was administered through the grid floor in Compartment A. The S could escape or avoid the shock only by crossing to Compartment B, where the hinged floor activated the microswitch which automatically terminated the shock and the stimuli (tone and light). The door was immediately retracted to the closed position, and the S remained in Compartment B for 1 min. At the end of the minute the S was returned to Compartment A. This started the next trial. On the second, third, fourth, and fifth day each S received 10 consecutive acquisition trials. On the sixth day, four acquisition trials were given immediately before the first 10 extinction trials were administered. Thereafter, each S received 10 extinction trials per day until the S reached the extinction criterion.

The extinction trials were run exactly as the acquisition trials except that the shock was disconnected and the four groups of Ss were subjected to different conditions. The groups were: (1) the social facilitation group (SF), (2) the anesthetized social facilitation group (ASF), (3) the inanimate object group (O), and (4) the control group (C). All the Ss were run individually. Those Ss belonging to Group SF received the extinction trials with three SF rats of the same age and strain present in Compartment A. The three SF rats had been conditioned to avoid Compartment B, and had also been habituated to the tone, light, and door-opening stimuli. A detailed description of the training procedures for the three SF rats is given in Marina (1972). Immediately after the conclusion of the last acquisition trial and during the 1-min intertrial interval, the shock was disconnected and the three SF Ss were placed in Compartment A. At the end of the intertrial interval, the experimental S was placed in Compartment A with the SF Ss. This started the first extinction trial. In a similar fashion for the Ss in Group ASF, three completely anesthetized rats were placed in Compartment A during the interval preceding the first extinction trial. In the succeeding trials the anesthetized social facilitators (ASF) were placed in different positions inside Compartment A during the intertrial interval when the S was in Compartment B. These positions were such that the door between compartments was never blocked. The objects used with the Ss in Group O (a small toy car about the size of a rat, and two 22.70 x 5.08 x 2.54 cm pieces of wood painted white) were also placed in different positions during the intertrial intervals. The positions occupied by the objects in Compartment A were made as similar as possible to those occupied by the three anesthetized social facilitators in Group ASF. Group C, the control group, was extinguished in the absence of other rats or objects.

The extinction criterion was met when the S failed to cross from Compartment A to Compartment B in less than 5 sec for five successive trials, or when the S remained continuously in

Compartment A for a 2-min interval. The maximum number of extinction trials given to any S was 60 trials. During training and extinction all the Ss were always run in the same order and at approximately the same time each day; the order was such that any effect of the time of the day would be balanced among the four groups.

RESULTS AND DISCUSSION

The mean latencies for the SF, ASF, O, and C groups were plotted as a function of the training trials. Inspection of these curves indicated that the acquisition of the conditioned avoidance response was similar across the four groups. During the last 12 trials, the mean latencies for all groups stabilized under 2 sec indicating a high degree of similarity across groups in the final stages of acquisition. This observation was confirmed by statistical analysis on the mean latencies during the last 10 trials of acquisition ($F = 2.51$, $df = 3/32$, $p > .05$).

Analysis of the extinction data revealed that none of the Ss in Groups SF and ASF failed to extinguish. On the other hand, two Ss in Group O and five Ss in Group C failed to meet the extinction criterion. The mean number of trials to extinction for the SF, ASF, O, and C groups were 6.44, 2.89, 42.33, and 51.67, respectively. A Kruskal-Wallis one-way analysis of variance by ranks comparing the number of trials to extinction revealed that there were significant differences among the groups ($H = 15.69$, $df = 3$, $p < .01$).

Mann-Whitney U Tests were performed on all possible pairs of treatments. Groups SF and ASF extinguished significantly faster than Group O and Group C ($p < .01$ in each case). There were no significant differences between Groups SF and ASF ($p > .05$) or between Groups O and C ($p > .10$).

The mere presence of other rats, then, seems to be the important variable in facilitating extinction in the present study. The anesthetized rats were observed to be as effective as the active, nonanesthetized rats in facilitating the extinction of a conditioned avoidance response. Interaction and mutual responsiveness, therefore, do not seem to constitute critical factors for the reduction of fear-motivated behavior as Latané and Glass (1968) had suggested. Nor does presentation of nonsocial stimuli during extinction appear to constitute a critical factor for the reduction of fear-motivated behavior. This finding argues against the interpretation of the social facilitation data in terms of a discernible change in the stimulus complex during the extinction phase.

It is possible that in the present experiment, the SF and ASF rats functioned as stimuli capable of eliciting responses incompatible with the avoidance behavior. It might be that the way laboratory rats are reared normally serves as a learning process which associates other members of the species with safety and satisfaction of primary needs. Angermeier et al (1965)

and Morrison and Hill (1967), for example, have reported that for animals reared in isolation, the presence of other animals had little or no effect upon fear-reduction. On the other hand, for animals reared socially, the presence of other animals resulted in a reduction of fear-conditioned behaviors. This could be the case in the present experiment since all Ss were normally reared in groups.

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Cross-modal matching by retarded and normal readers*

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Birch and Belmont (1964) claimed from a study of auditory-visual matching that retarded readers have a deficiency in auditory-visual integration. However, the present experiment indicates that when auditory-visual matching is compared with the relevant intramodal and visual-auditory matching tasks, retarded readers make fewer correct responses compared to normal readers only when an auditory pattern is the initial stimulus. A second experiment confirmed that retarded readers compared to normal readers were unable to hold an auditory pattern in short-term store, though there was no difference between the groups in the retention of a visual pattern.

Intuitively reading skills depend upon an integration of visual and auditory information. The person learning to read is shown a printed word (or perhaps the word and corresponding picture), a syllable, or even a letter, and taught the associated sound. Birch and Belmont (1964) found that retarded readers (dyslexics) were significantly inferior to normal readers, matched for age and IQ in auditory-visual (AV) matching, and they argued that retarded reading reflects a breakdown in AV integration. However, as Bryant (1968) has pointed out, errors in cross-modal matching (CMM) may be due to

failures of processing in one or both of the modalities involved instead of, or in addition to, failures of intersensory integration. Since Birch and Belmont (1964) included neither the relevant intramodal matching (IMM) tasks nor visual-auditory (VA) matching in their comparisons, their confident conclusion is unwarranted.

Further, as Rubinstein and Gruenberg (1971) point out, it is difficult to interpret even errors in AV matching using the Birch and Belmont procedure (an auditory pattern is tapped out; the S has to select the correct visual match from a number of Morse-code-like visual patterns) since it may confound errors of temporal (auditory) to spatial (visual) transfer with CMM errors. The same criticism can be made of the work of Muehl and Kremenak (1966), even though they included IMM controls. There is evidence (Blank & Bridger, 1966;

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